TWO NEW SPECIES OF *ANOPLOGNATHUS* LEACH (COLEOPTERA: SCARABAEIDAE: RUTELINAE) FROM QUEENSLAND

PETER G. ALLSOPP

BSES Limited, PO Box 86, Indooroopilly, Qld 4068
(E-mail: pallsopp@bses.org.au)

Abstract

Anoplognathus debaari sp. n. and *A. storeyi* sp. n. are both described from specimens collected at Cooloola in southeastern Queensland, Australia. The discovery of two new species of the genus in such a relatively well collected area is remarkable. The new species are incorporated into revised key sections. Notes are given on the biology of the new species.

Introduction

Beetles of the genus *Anoplognathus* Leach, commonly called Christmas beetles, are conspicuous during summer in eastern and southern Australia, with many species feeding on the leaves of *Eucalyptus* spp. (Myrtaceae) and being implicated in 'dieback' of those trees. Larvae are less conspicuous, living underground, but their feeding on the roots of pasture grasses and their occurrence in sugarcane fields makes them economically important. Carne (1957) revised the genus, recognizing 32 species, including four subspecies other than nominate subspecies in three polytypic species (one in New Guinea). One species, *Trioplognathus griseopilosus* (Ohaus), has since been removed from the genus (Carne 1958), and a further five species have been described (Carne 1981, Allsopp and Carne 1986, Allsopp 1990). In the four papers additional to Carne's (1957) revision, modifications to his key were outlined to incorporate the new species and to clarify parts of the key. Cassis and Weir's (1992) catalogue listed 36 species for Australia.

Here, I describe and give notes on two new species from southeastern Queensland, the novelty of which was recognized by the collector, Murdoch De Baar. The discovery in southern Queensland of two large, obvious and undescribed species of a genus as well known as *Anoplognathus* is remarkable and illustrates the diversity still to be catalogued. I also incorporate the new species in revised sections of Carne's (1957) key.

Types are deposited in the Australian National Insect Collection, Canberra (ANIC); Murdoch De Baar collection, Brisbane (MDB); Peter Allsopp collection, Brisbane (PGA); the Queensland Forest Insect Collection, Queensland Primary Industries and Fisheries, Brisbane (QFIC); and the Queensland Museum, Brisbane (QM).

Anoplognathus storeyi sp. n.

(Figs 1-2, 5)

Types. Holotype ♂, QUEENSLAND: 0.5 km NE of Camp Milo, Seary's Creek catchment, near Broutha Scrub, Cooloola Nat. Park, Cooloola, 23.x.1992, M. & G. De Baar, flying off ground – dusk – scribbly gum, etc, site (in QM, registered type

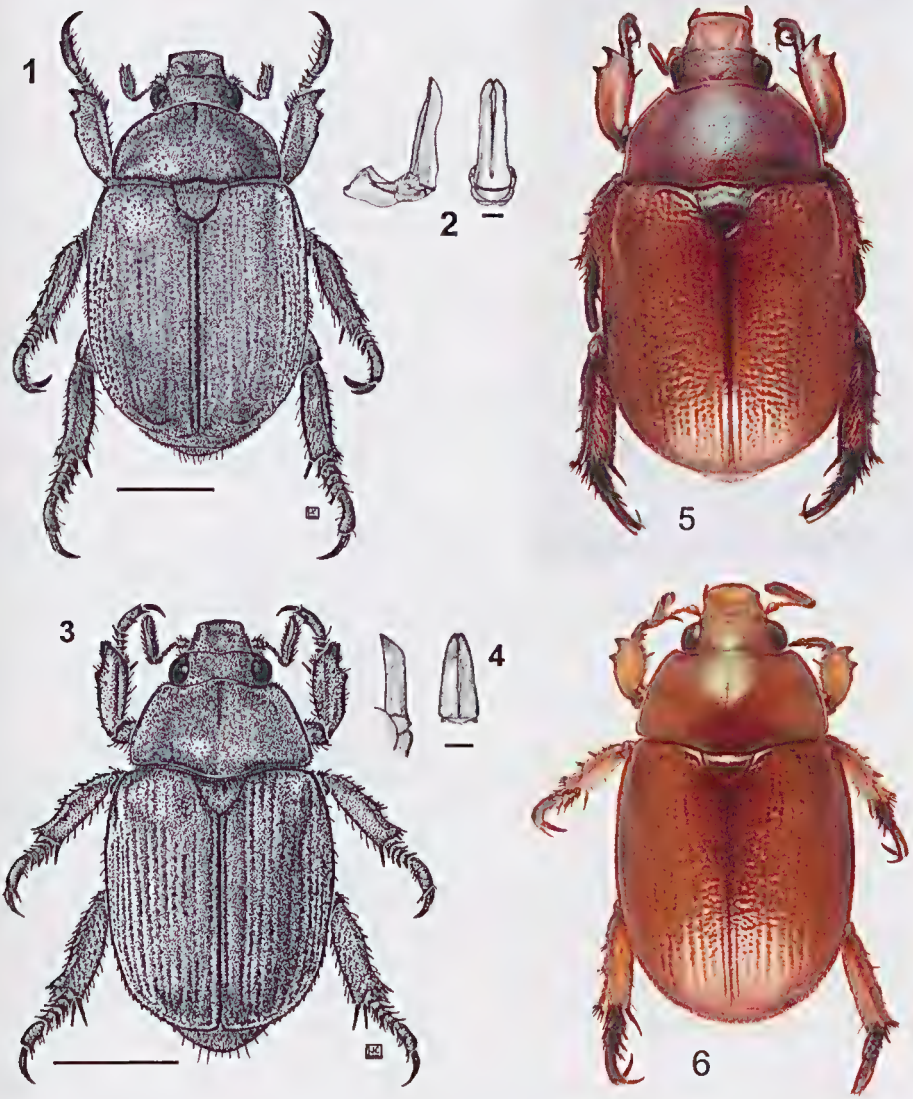
T144011). *Paratypes*: 1 ♂, same locality as holotype, 23.x.1992, M. & G. De Baar, to m.v. [mercury–vapour] light (MDB); 1 ♀, same data as holotype (QM); 2 ♂♂, same locality as holotype, 26.x.1998, M. De Baar (ANIC, QFIC); 1 ♂, same locality as holotype, 28.x.1998 (PGA); 1 ♀, same locality as holotype, 7.xi.1992, M. De Baar, to m.v. [mercury-vapour] light (ANIC).

Diagnosis. Upper surface of clypeus almost square and with anterior margin distinctly upturned, with semicircular depression (Figs 1, 5); mesosternal process extending anterior to mesocoxae, but not reaching hind margin of procoxae, apex acute and glabrous; sutural point of elytron with short spine; pygidium brown. Closely related to the group containing *A. hirsutus* Burmeister, *A. suturalis* Boisduval and *A. rubiginosus* Macleay, which are differentiated by having the mesosternal process of medium length so that it does not extend to at least the hind margin of the fore coxae but it is not very short.

Description. Male: Body 21.0-23.0 mm long. Dorsal surface tan-brown, pronotum, scutellum and pygidium darker than head and often slightly darker than elytra, head, pronotum, scutellum and pygidium with greenish reflections; pronotum with darker irregular mottling; venter dark tan-brown with greenish reflections; legs dark tan-brown, tarsi and antennae darker brown; dorsal and ventral setae white.

Head. Labrum broadly triangular, surface rugose-punctate, base with a transverse row of setae, disc with scattered slightly thinner and slightly longer setae. Clypeolabral suture distinct, very slightly curved forwards in middle. Clypeus with anterior face about half length of upper surface; surface of anterior face micropunctate with a few scattered large irregular depressions, glabrous except for long setae near baso-lateral angles; upper surface with anterior margin reflexed, margin convex, lateral margins tapering inwards from anterior margin to where anterior margin is reflexed, then tapering outwards to posterior margin and forming obtuse angle with clypeal suture; upper surface with a depressed triangular area behind the reflexed margin with apex just on to frons; surface either side of depression with rounded triangular ridges; surface punctate with short setae, setae denser behind reflexed anterior margin and towards sides. Frontoclypeal suture distinct, slightly anteriorly convex. Frons glabrous, surface evenly convex except for slight continuation of clypeal depression on anterior edge, micropunctate with scattered distinct punctures. Ocular canthus with short, white setae.

Thorax. Pronotum glabrous; surface with poorly defined, scattered punctures, smaller and sparser near midline, larger and denser towards lateral margins; anterior margin almost straight in middle then curving around head; posterior margin with indent in middle of broad median lobe; lateral margins gently curved; upper surface of pronotum defined by a groove except almost absent in the middle of the posterior and anterior margins; anterior angles slightly



Figs 1-6. *Anoplognathus* spp. (1-2) *A. storeyi* sp. n.: (1) male, dorsal habitus (scale = 5 mm); (2) parameres, lateral and frontal views (scale = 1 mm). (3-4) *A. debaari* sp. n.: (3) male, dorsal habitus (scale = 5 mm); (4) parameres, lateral and frontal views (scale = 1 mm). (5) *A. storeyi* sp. n., male, dorsal habitus. (6) *A. debaari* sp. n., male, dorsal habitus.

acute, posterior angles obtuse. Scutellum shield-shaped, glabrous, with a few scattered punctures on otherwise smooth surface; anterior edge fringed with long, dense, backwardly directed white setae from beneath posterior edge of pronotum. Elytra with well-defined rows of glabrous punctures; sutural line more impressed than other striae; surface between punctures with complex, irregular pattern of slightly convex 'cells', reminiscent of wing venation; sutural angles in contact, with a short spine; lateral margins of elytra with scattered, short, yellow setae. Venter with long, dense, white setae. Metasternal process extending just in front of the anterior margin of the mid coxae; apex acute, glabrous. Fore tibia with a longitudinal line of short, yellow setae and short, yellow setae towards outer edge; bidentate, with teeth at less than right angles to major axis, smaller tooth acute.

Abdomen. Pygidium shagreened, with medium-density, backwardly directed, white setae and patch of longer, yellowish setae at apex. Ventrites with scattered medium, white setae, less dense than thorax.

Male genitalia. Parameres with upper and lower edges almost straight for most of length (Fig. 2).

Female. Similar to male, except: slightly larger (about 23-24 mm long); clypeus with anterior margin broadly rounded and slightly recurved upwards along edge, surface punctate, each puncture with a very short seta, surface with median depression on posterior half; frons with very small setae; pygidium with tuft of setae near apex shorter and less dense than in male; inner larger claw of fore leg bifurcate at the apex.

Etymology. Named in memory of Ross Storey whom I first met at the University of Queensland in the early 1970s and who remained a good friend until his untimely death. The way that he made the most of his life provides an example for all.

Comments. Both sexes fly at dusk and are attracted to light. This species flies during spring (October and November), unlike the more characteristic Christmas beetles that fly during December. *A. storeyi* can be incorporated into Carne's (1957) key (subsequently modified by Carne (1958)) by deleting couplets 27 and 28 and substituting the following:

27(1) Pygidium brown; upper surface of clypeus almost square and with anterior margin distinctly upturned, with semicircular depression; sutural point of elytron with short spine; Cooloola area of southern Queensland ..... *A. storeyi* Allsopp, sp. n.

\- Pygidium dark green; clypeus with anterior margin more rounded and slightly upturned; elytra without sutural spines 27a

27a(27) Elytral apices individually rounded, giving a small re-entrant angle; baseolateral angles of pronotum commonly with white setae;

southern Queensland, New South Wales tablelands, Australian Capital Territory and southern coast, Victoria .... *A. hirsutus* Burmeister

- Elytral angles contiguous; baseolateral angles of pronotum glabrous 28

28(27a) Clypeus and anterior angles of pronotum with conspicuous white setae; southern Queensland, New South Wales tablelands, Australian Capital Territory and southern coast, Victoria, Tasmania .... *A. suturalis* Boisduval

- Clypeus with at most a few yellowish setae near frontoclypeal suture; pronotum glabrous; New England tablelands of northern New South Wales ..... *A. rubiginosus* Macleay

Anoplognathus debaari sp. n.

(Figs 3-4, 6)

Types. Holotype ♂, QUEENSLAND: 0.5 km NE of Camp Milo, Seary's Creek catchment, near Broutha Scrub, Cooloola Nat. Park, Cooloola, 20.ii.1999, M. & G. De Baar, flying at dusk 18.30-19.00 hrs (in QM, registered type T62718). *Paratypes*: 8 ♂♂, same data as holotype (5 QM, 2 MDB, 1 QFIC); 12 ♂♂, same locality as holotype, flying at 1830-1900 hrs in scrub adjoining Searys Creek catchment, M. & G. De Baar, with additional data: 1 ♂, 18.ii.2007 (PGA); 2 ♂♂, 18.ii.2007, died 26.ii.2007 (ANIC); 1 ♂, 18.ii.2007, died 27.ii.2007 (ANIC); 2 ♂♂, 20.ii.2007 (MDB); 2 ♂♂, 21.ii.2007 (MDB); 1 ♂, 21.ii.2007, died 15.iii.2007 (QFIC); 1 ♂, 21.ii.2007, died 16.iii.2007 (MDB); 1 ♂, 21.ii.2007, died 18.iii.2007 (MDB); 1 ♂, 21.ii.2007, died 20.iii.2007 (ANIC).

Diagnosis. Small species (about 17-18.5 mm long); mesosternal process very short, not extending anterior to mesocoxae, apex clothed with long setae; ventral vestiture pale yellow; dorsally brown, pronotum with green reflections. Closely related to *A. blackdownensis* Carne, the only other *Anoplognathus* that has a very short mesosternal process that is clothed with long setae.

Description. Male. Body 17.0-18.5 mm long. Dorsal surface tan-brown, pronotum, scutellum and pygidium darker than head and often slightly darker than elytra, head, pronotum and scutellum with green reflections; elytra with darker irregular mottling, especially around the humeri and posteriorly; venter tan-brown; legs tan-brown, edged in black, tarsi darker brown; antennae darker brown; dorsal and ventral setae yellow.

Head. Labrum broadly triangular, surface rugose-punctate and with long setae. Clypeolabral suture distinct, very slightly curved forwards in middle. Clypeus with anterior face about half length of upper surface (Figs 3, 6); surface of anterior face micropunctate with scattered large punctures each with a long seta; upper surface with anterior margin slightly reflexed, margin convex; lateral margins tapering outwards to posterior margin with a small

bend at base of reflexed margin and forming obtuse angle with clypeal suture; surface with a slightly depressed circular area behind the reflexed margin, surface rugosly punctate and with short setae. Frontoclypeal suture distinct, sinuate with centre more posterior. Frons glabrous on posterior half; anterior half with setae similar to clypeus; surface almost flat except for slight depession near centre of frontoclypeal suture; anterior rugosly punctate, punctures more distinct and more scattered posteriorly. Ocular canthi with setae similar to those on clypeus.

Thorax. Pronotum glabrous, surface with scattered punctures, smaller and sparser near midline, larger and denser towards lateral margins; anterior margin evenly concave, posterior margin with rounded broad lobe in middle, lateral margins broadly convex; defined by a groove except in the middle of the posterior margin opposite the scutellum and in the middle of the anterior margin; anterior angles slightly acute; posterior angles broadly rounded. Scutellum triangular, glabrous, with scattered punctures; anterior edge covered with short, backwardly directed white setae projecting from beneath posterior edge of pronotum. Elytra with well-defined rows of glabrous punctures; sutural line more impressed than other striae; surface between punctures with complex, irregular pattern of slightly convex 'cells', reminiscent of wing venation; sutural angles rounded; lateral margins with scattered, short, yellow setae. Venter with long, dense, white setae. Metasternal process short, not quite reaching the anterior margin of the mid coxae, apex clothed with long setae. Fore tibia with well-defined longitudinal line of short, yellow setae; few scattered white setae towards outer edge; bidentate, with teeth at less than right angles to major axis, smaller tooth slightly obtuse.

Abdomen. Pygidium shagreened, with medium-density, backwardly directed, yellow setae and occasional longer setae, especially towards apex. Ventrites with scattered medium, pale yellow setae and a few scattered, longer, yellow setae.

Male genitalia. Parameres with upper and lower edges almost straight for most of length (Fig. 4).

Female. Unknown.

Etymology. Named for the collector, Murdoch De Baar.

Comments. This species flies late in summer (February and March), unlike the more characteristic Christmas beetles that fly during December.

Males flew just after dark from 1830 to 1900 hours on all four dates they were collected. They flew no higher than 1.5 m and were not attracted to mercury-vapour, ultraviolet or fluorescent-tube light traps. Occasional swoops were made to a dim bulb attached to a Perspex sheet and trough, and a couple of beetles were intercepted. Males flew in a scrambled manner, and

appeared to congregate or land on foliage. Having flown for a short period, they appeared to re-enter the soil.

No females have been seen or collected from pitfall traps, netting or examination of leaf litter. I assume that they remain in the soil and attract males through pheromones or other signals. One beetle (assumed to be a male) flew over leaf litter in small circles – this is similar to the behaviour of other scarabs where the females do not fly. Some other *Anoplognathus* spp. mate in feeding trees.

Beetles were confined to, or flew around the edges of a small patch of rainforest along part of the Searys Creek catchment. This scrub is isolated from, but very near to Broutha Scrub. Soils are deep sand, and support as its major vegetation *Backhousia myrtifolia* J.D. Hook. & Harvey (Myrtaceae, grey myrtle), but other species, such as brush box (*Lophostemon confertus* (R. Br.) P. G. Wilson & J.T. Waterh., Myrtaceae), kauri pine (*Agathis robusta* (C. Moore ex F. Muell) F.M.Bailey., Araucariaceae), are also present.

Specimens returned to Brisbane and kept in a tank with sand and some leaf litter would only emerge to fly whenever it became dark, whether that was at 2100 or 2200 hours, and after a very short period, re-entered the soil. Under natural light conditions, it became dark enough about 1835 or 1840 hours and activity would then commence. If artificial light was used to make observations, beetles became inactive.

Three specimens were kept alive in a container with damp tissues for 8 days (2 males) and 9 days (1 male). Four specimens were kept in a small tank with damp sand with fine humus and a few dead leaves, and these beetles lived for 22 days (1 male), 23 days (1 male), 25 days (1 male), 27 days (1 male). This suggests that the species may also be active in March.

Anoplognathus debaari and *A. blackdownensis* Carne can be incorporated into, and *A. antiquus* Arrow (=*Trioplognathus griseopilosus* (Ohaus) determined by, Carne (1958)), deleted from Carne's (1957) key, by deleting couplets 29-31 and inserting:

29(1) Apex of mesosternal process clothed in long decumbent setae 30

\- Apex of mesosternal process glabrous (sometimes with sparse setae) 31

30(29) Larger species (about 19-21 mm long); ventral vestiture white; pronotum slightly darker than elytra and with greenish gold reflections; central Queensland ..... *A. blackdownensis* Carne

\- Smaller species (about 17-18.5 mm long); ventral vestiture pale yellow; dorsally brown, pronotum with green reflections; Cooloola area of southern Queensland ..... *A. debaari* Allsopp, sp. n.

31(29) Pygidium glabrous (except at apex); coastal Queensland ..... *A. parvulus* Waterhouse

- Pygidium uniformly clothed with decumbent white setae 32

32(31) Clypeus densely clothed with erect white setae; female with the central elytra slightly flared along the outer edge; eastern Queensland to central New South Wales ..... *A. brunnipennis* (Gyllenhal)

- Clypeus glabrous; female with no lateral flaring of the elytra; northeastern Queensland ..... *A. daemeli* Ohaus

Acknowledgements

I thank Lindsay Chandler and Geoff Thompson for the illustrations, Murdoch De Baar for access to the specimens and his notes on the biology of the two species, and Andrew Smith for comments on an earlier version of the manuscript. The specimens were collected under Scientific Purposes Permit C6/000125/98/SAA.

References

ALLSOPP, P.G. 1990. *Anoplognathus hilleri* sp. nov. (Coleoptera: Scarabaeidae: Rutelinae) from southeast Queensland and notes on *A. flindersensis* Carne. *Memoirs of the Queensland Museum* **28**: 377-381.

ALLSOPP, P.G. and CARNE, P.B. 1986. *Anoplognathus vietor* sp. n. (Coleoptera: Scarabaeidae: Rutelinae) from west Queensland. *Journal of the Australian Entomological Society* **25**: 99-101.

CARNE, P.B. 1957. A revision of the ruteline genus *Anoplognathus* Leach (Coleoptera: Scarabaeidae). *Australian Journal of Zoology* **5**: 88-143.

CARNE, P.B. 1958. A review of the Australian Rutelinae (Coleoptera: Scarabaeidae). *Australian Journal of Zoology* **6**: 162-240.

CARNE, P.B. 1981. Three new species of *Anoplognathus* Leach, and new distribution records for poorly known species (Coleoptera: Scarabaeidae: Rutelinae). *Journal of the Australian Entomological Society* **20**: 289-294.

CASSIS, G. and WEIR, T.A. 1992. Rutelinae. Pp 359-382, *in*: Houston, W.W.K. (ed.), *Zoological catalogue of Australia. Coleoptera: Scarabaeoidea.* Volume 9. Australian Government Publishing Service, Canberra.